

## Chapter 1.45

# Gender and the Culture of Computing in Applied IT Education

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### INTRODUCTION

The “shrinking pipeline” of women who ascend through the ranks in computer science education programs and careers is by now a familiar problem. Women drop out at rates faster than men at all levels of educational and professional advancement, resulting in a gender gap especially pronounced at the highest levels of the computing workforce, and that has not narrowed appreciably at any level in more than 20 years (Camp, 1997; ITAA, 2005; Vegso, 2005). Efforts to move more women into the pipeline at lower levels have met with limited

success (cf. the Carnegie Mellon experience as reported by Margolis & Fisher, 2002); girls and women still express less interest than boys and men in studying computer science and pursuing information technology (IT) careers (Bentson, 2000; Vegso, 2005).

A reason often cited in the literature is the masculine culture of many computer science programs and IT workplaces, which is perceived by many women as alien and unwelcoming (Bentson, 2000; Spertus, 1991; Turkle, 1988). Even when institutions make efforts to treat women and men equally or accord women special consideration

in admissions and hiring decisions, attitudes discouraging women from entering computing persist, both within the institutions and in society at large. Sometimes these attitudes are expressed overtly: Underground “hacker” culture is notoriously antagonistic to women (Gilboa, 1996), and even mainstream computer aficionados respond with resistance and sexist jokes to proposals to recruit more girls and women to study computer science (Slashdot.org, 2005). Moreover, there is a widespread perception that computer experts are socially-isolated “geeks” or “nerds” obsessed with technology, a mode of being that women, who tend to be more socially oriented, find unappealing (Margolis & Fisher, 2002; Turkle, 1988).

Fortunately, the situation for computer science does not tell the whole story. In the latter part of the 20th century, the expansion of computing and the Internet fueled the rise of applied IT fields in which technical skills, rather than being developed for their own sake, are increasingly put to use in the service of human needs. Applied fields, such as information science, information systems and instructional technology, have gained strength, and a new interdisciplinary field, informatics, has emerged. At the same time, interest in computer science itself is declining, especially among women (ITAA, 2005; Vegso, 2005). In this chapter, we explore the possibility that applied IT fields may provide more women-friendly cultures while still focused on technology. The larger question underlying this exploration is: Does applied IT education have the potential to bridge the “gender computing gap”?

## **BACKGROUND**

Previous research has focused primarily on problems faced by women in computer science, especially in undergraduate-level education (Camp, 1997; Cohoon, 2001; Spertus, 1991). Many influences have been cited as contributing to the

educational gender gap in computer science, including aspects of institutional culture, such as lack of role models (Pearl, Pollack, Riskin, Thomas, Wolf, & Wu, 1990), mentoring and advising (Whitely, Dougherty, & Dreher, 1991), informal networking (Smith-Lovin & McPherson, 1993) and a sense of belonging and identity (Ely, 1995); work-family conflict (Netemeyer, Boles, & McMurrian, 1996); and teaching styles (Cohoon, 2001; Turkle, 1988).

One of the most often-cited factors that discourage girls and women from studying computer science is the culture of computing itself: Computing is historically and conventionally associated with masculinity, an association that attracts boys to computers who then become role models for other boys, creating environments in which girls feel marginalized (Hacker, 1990; Turkle, 1988). Citing Margolis and Fisher (2002), Read (2002) argues that “women are further alienated by a stifling ‘geek culture’ that celebrates obsessive computing at the expense of broad interests.” Hackers are perceived as keeping exceptionally long hours and late nights, and manifesting “highly focused, almost obsessive behavior” (Frenkel, 1990, p. 38). For many women, this work ethic conflicts with their desire to start a family or, if they are older, their actual family responsibilities. Meanwhile, hackers, who are predominantly male, are seen as being “bright and creative,” while women remain on the periphery. Rasmussen and Hapnes (1991) suggest that this type of culture is important in producing and reproducing male domination in higher education in computer-related fields and that it influences the integration of women and their position within the field of computing.

The abstractness of much computer science instruction exacerbates the gender-biased culture, in that girls are more likely to be interested in real-world problem solving in contexts involving human users than in machines and programming languages (Clarke, 1992). A related deterrent for women is that most introductory computer sci-

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